

Design and Produce Millimeter Wave Dipole Chaff with High Radar Cross Section

NOTE: The Solicitations and topics listed on this site are copies from the various SBIR agency solicitations and are not necessarily the latest and most up-to-date. For this reason, you should use the agency link listed below which will take you directly to the appropriate agency server where you can read the official version of this solicitation and download the appropriate forms and rules.

The official link for this solicitation is:

<http://www.acq.osd.mil/osbp/sbir/solicitations/sbir20152/index.shtml>

Agency:

Department of Defense

Release Date:

April 24, 2015

Branch:

n/a

Open Date:

April 24, 2015

Program / Phase / Year:

SBIR / Phase I / 2015

Application Due Date:

June 24, 2015

Solicitation:

[DoD 2015.2 SBIR Solicitation](#)

Close Date:

June 24, 2015

Topic Number:

N152-082

Description:

Current aircraft radio frequency (RF) chaff is made from aluminum coated glass filaments produced in a continuous strand and then cut to lengths that achieve the desired resonance at frequencies in the 2-18 GHz band. The filaments require a slip coating to prevent end welding of fibers when cut, and to minimize clumping when ejected. The typical chaff cartridge can contain millions of these coated glass filaments and has multiple sections of different lengths to create a reflective response across many frequencies at the same time [Ref. 2,3,4]. The millimeter wave band of 30 to 40 GHz is not addressed in the fielded chaff cartridge. The current chaff material is not well suited to be cut and packaged to lengths required for efficacy in the millimeter wave region. Also, calculations show the amounts needed to produce the required response in that region cannot be achieved in the volume of the current chaff cartridge. Recent advances in nano-fibers, nanotubes, meta-materials, conductive polymers, graphite fibers, graphene fibers, metal nanowire technologies, and coating techniques using copper, silver, aluminum, zinc, etc., provide some promise that new higher performing chaff can be produced on a large scale. [Ref. 1,]. The new chaff may be able to double, triple, or even quadruple the number of dipoles in the available volume. A novel dipole chaff material is needed that can be utilized for millimeter wave frequencies, is low cost, and can be produced easily in sufficient quantities, by industry, to satisfy the needs of the military community. This new chaff must have high scattering RCS in the 33 to 38 GHz frequency band. Target cartridge volume is

1.4 inch diameter X 5.8 inch long cylinder. It is desired that the material RCS exceed 500 square meters at 35 GHz per cartridge. NAVY - 10 PHASE I: Design, develop and prove feasibility of new innovative chaff in accordance with the parameters in the Description. Provide a detailed analysis conducted by modeling and simulation, calculation or measurement of individual dipole RCS performance and then scale up the RCS performance for a volumetric chaff cloud result. If objective is met for the proposed frequency band of 33 to 38 GHz, then investigate the scalability of the material for the 2 to 18 GHz frequency band to show increase/decrease of effectiveness.

Agglomeration or bird-nesting of dipole payload must not exceed 20 percent of sample to facilitate dispersion of the chaff payload upon dispense. The target materials have been in existence for some time now and the basic process of combining and coating have been the subject of experimentation on a small scale. Production of a small quantity consisting of a few ounces of the material to prove the ease of manufacture and demonstrate the simplified process is desired. PHASE II: Develop a pilot scale manufacturing process for the chaff material. Test material in a controlled environment and demonstrate that modeling and simulation results confirm actual performance findings. Develop plans to integrate the chaff with a dissemination device such as Navy RR-129 cartridge form factor. Using Government Furnished Equipment (GFE) cartridges, produce and provide 30 flight test ready samples for Government-furnished testing on an air platform in order to fully characterize the effects of this chaff on a Navy test range. Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by DoD 5220.22-M, National Industrial Security Program Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Security Service (DSS). The selected contractor and/or subcontractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances, in order to perform on advanced phases of this project as set forth by DSS and NAVAIR in order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material IAW DoD 5220.22-M during the advanced phases of this contract. PHASE III: Develop a full-scale manufacturing process for proposed material. Participate in qualification testing efforts of the proposed material. Assist in the transition of the technology to appropriate air platforms.